IN THE MATTER OF THE APPLICATION OF ATLAS CORPORATION FOR AN ORDER APPROVING A RECLAMATION AGREEMENT COVERING THE ATLAS CORPORATION URANIUM PROCESSING MILL AND ASSOCIATED TAILINGS AREA AT MOAB, UTAH

Cause No. ACT-019003

Atlas Corporation (hereinafter "Applicant"), by and through its undersigned attorneys, hereby applies to the Board of Oil, Gas and Mining of the State of Utah for approval of the attached Reclamation Agreement covering reclamation of Applicant's uranium processing mill and associated tailings area (hereinafter the "Mill") at Moab, Utah. This application is submitted pursuant to Utah Code Ann. §26-25-4 and the Executive Order of the Governor of Utah dated May 15, 1979, designating the Board of Oil, Gas and Mining to consider for approval the attached Reclamation Agreement.

In support of this application, Applicant respectfully alleges and shows:

1. Applicant is a Delaware Corporation, qualified to do business in the State of Utah.

2. Applicant operates the Mill under Source Material License No. SUA-917 (hereinafter the "License"), issued by the United States Nuclear Regulatory Commission (hereinafter "NRC"), renewed by the NRC effective April 30, 1979. A copy of the License is attached hereto as Appendix A and by this reference made a part hereof.

3. Pusuant to Condition 24 of the License, Applicant is required to submit to the NRC by October 30, 1979 a copy of the surety arrangements entered into with the State of Utah covering reclamation of the Mill.

4. Applicant has sufficient finacial capability to comply with the obligations to be imposed on Atlas by the attached Reclamation Agreement. A summary of said financial capability, entitled "Summary Description of Atlas Corporation," is attached hereto as Appendix B and by this reference made a part hereof.

5. A summary of the requirements for reclamation of the Mill, entitled "Summary of Stabilization and Reclamation of the Mill Tailings Disposal Area for Atlas Minerals Mill at Moab, Utah," is attached hereto as Appendix C and by this reference made a part hereof.

WHEREFORE, Applicant respectfully requests that this application and matter be set for hearing at the next scheduled meeting of the Board of Oil, Gas and Mining and that upon conclusion of such meeting the Board enter its order approving the attached Reclamation Agreement.

DATED this 16th day of May, 1979.

Respectfully submitted,

VAN COTT, BAGLEY, CORNWALL & McCARTHY

By _____

James A. Holtkamp
Counsel for Applicant
141 East First South
Salt Lake City, Utah 84111

RECLAMATION AGREEMENT

THIS AGREEMENT, made and entered into this ____ day of _____, 1979, between Atlas Corporation, a Delaware corporation (hereinafter called the "Operator"), and the Board of Oil, Gas, and Mining, duly authorized and existing by virtue of the laws of the State of Utah (hereinafter called the "Board").

W I T N E S S E T H:

WHEREAS, the Operator is the owner and in possession of that certain uranium processing mill and associated tailings disposal area in Moab, Grand County, State of Utah (hereinafter called the "Mill").

WHEREAS, on _____, 1979, the United States Nuclear Regulatory Commission approved the Operator's application for renewal of Source Material License SUA-917 (hereinafter called the "License") for operation of the Mill; and

WHEREAS, the Operator is able and willing to conduct reclamation operations at the Mill in accordance with the requirements specified in the License; and

WHEREAS, the Board has considered the factual information and recommendations provided by the staff of the Division of Oil, Gas, and Mining as to the magnitude, type and costs of

the reclamation activities planned for the Mill.

NOW, THEREFORE, for and in consideration of the mutual covenants of the parties by each to the other made and herein contained, the parties agree as follows:

1. The Operator agrees to conduct reclamation activities at the Mill in accordance with the conditions of the License.

2. If the Operator fails to commence reclamation activities at the Mill in accordance with the requirements specified in the License within TWO (2) years after the tailings area has reached sufficient dryness to allow such activities to commence, the Operator shall pay to the Board FOUR MILLION NINE HUNDRED THOUSAND DOLLARS ($4,900,000.00), reduced by the cost of any reclamation already performed as required by the License in accordance with the provisions of paragraph 3 of this Agreement. Said sum shall be used by the Board to complete reclamation activities at the Mill in accordance with the requirements specified in the License.

3. If the Operator completes any reclamation work at the Mill which is required to be performed pursuant to the License, the total amount specified in paragraph 2 of this Agreement shall be reduced by the cost of such work as indicated by an accounting of costs for the work supplied to the Board by the Operator. Any such reduction shall be

evidenced by an amendment to this Agreement executed by the parties hereto and approved by the Board. If any of said work is completed before the cessation of permanent operations at the Mill, allowance shall be made for inflation of the cost of said work from the time that said work was performed to the cessation of such operations.

IN WITNESS WHEREOF, the parties hereto have respectively set their hands and seals this _____ day of _____, 1979.

ATTEST:

ATLAS CORPORATION

_____
Secretary

By_____

SEAL

BOARD OF OIL, GAS, AND MINING

By_____

STATE OF)
: ss.
COUNTY OF)

On the _____ day of _____, 1979, A.D., personally appeared before me _____, who being by me duly sworn did say that he is the _____ of Atlas Corporation, and that said instrument was signed in behalf of said corporation by authority of its bylaws, and said _____ acknowledged to me that said corporation executed the same.

_____
NOTARY PUBLIC
Residing At: _____

My Commission Expires:

_____

Thalia R. Busby, Secretary of the Board of Oil, Gas, and Mining of the State of Utah, hereby certifies that the foregoing Reclamation Agreement was approved by the Board on the _____ day of _____, 1979, in Cause No. _____.

_____

APPENDIX A

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

APR 2 3 1979

RECEIVED
5-4-79

FCPF:FDL
40-3453
SUA-917

Atlas Minerals
ATTN: Mr. Al Dearth
1050 17th Street
Suite 2506
Denver, Colorado 80265

Gentlemen:

Enclosed is Source Material License No. SUA-917. This license is being renewed subsequent to the notice of availability by the Environmental Protection Agency on February 5, 1979, of the Nuclear Regulatory Commission's Final Environmental Statement (FES) related to the operation of your uranium mill.

Please note that your license contains additional conditions which were discussed between your Mr. A. E. Dearth and Mr. F. D. Lomax of my staff.

As you are aware, the Commission has initiated the preparation of a Generic Environmental Impact Statement (GEIS) on uranium milling. Please be advised that the conclusions of this GEIS, and any related rule making, may result in new requirements concerning your mill waste generating processes and tailings management practices.

FOR THE NUCLEAR REGULATORY COMMISSION

Ross A. Scarano, Section Leader
New Facilities Section
Uranium Recovery Licensing Branch
Division of Waste Management

Enclosure:
SUA-917

MATERIALS LICENSE

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974 (Public Law 93-438), and Title 10, Code of Federal Regulations, Chapter 1, Parts 30, 31, 32, 33, 34, 35, 36, 40 and 70, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear material designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s); and to import such byproduct and source material. This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

Licensee	
1. Atlas Corporation	3. License number SUA-917
2. Atlas Minerals Division P.O. Box 1207 Moab, Utah 84532	4. Expiration date April 30, 1984
	5. Docket or Reference No. 40-3453

6. Byproduct, source, and/or special nuclear material	7. Chemical and/or physical form	8. Maximum amount that licensee may possess at any one time under this license
Natural Uranium	Any	Unlimited

9. The licensee is hereby authorized to possess byproduct material in the form of uranium waste tailings generated by the licensee's milling operations authorized under SUA-917.

10. Authorized Place of Use: The licensee's uranium milling facility located at Moab, Utah.

11. The average mill throughput shall not exceed 850 MT of barreled U_3O_8 per year.

12. For use in accordance with statements representations and conditions contained in Sections 4, 5, and 7 of the licensee's application dated November 18 1974 and supplements dated August 15 and 28, 1975. Whenever the word "will" is used in the above mentioned sections, it shall denote a requirement.

13. Any changes in the effluent control systems, as described in the licensees submittal dated April 20, 1978 shall require approval by the USNRC in the form of a license amendment.

14. The licensee shall prevent release of airborne particulates from the tailings pile by maintaining water cover over the tailings. If any tailings are not covered by standing water, the applicant shall take measures to minimize dispersal of blowing tailings. The effectiveness of the measures shall be evaluated weekly by means of a documented tailings area inspection.

15. The tailings impoundment area shall not be expanded by raising the height of the present dam or constructing a new dam without specific prior approval of the NRC obtained through application for amendment of this license.

16. The licensee shall within three years of the renewal date of this license complete the installation of riprap protection for the tailings dam along Moab Wash. The design must be submitted for NRC review and concurrence prior to January 1, 1980.

    The following criteria shall be incorporated in the riprap design.

    a) upstream of section B (as shown in Exhibit H of the licensee's submittal of October 3, 1978).

Velocity of Flow	14 feet per second
Depth of Flow	8 feet
Factor of Safety	1.5
Freeboard	1 foot

    b) downstream of section B

Flow velocity	17 feet per second
Depth of Flow	10 feet
Factor of Safety	1.0
Freeboard	1 foot

17. Mill tailings other than samples for research shall not be transferred from the site without specific prior approval of the NRC obtained through application for amendment of this license. The licensee shall maintain a permanent record of all transfers made under the provisions of this condition.

18. At the end of milling operations or when settling pond use is discontinued, the licensee shall remove all sediment from ponds where radium has been precipitated and transport it to the tailings ponds. The sediment shall be kept wet or other means shall be used to eliminate release of dust during pond evaporation, sediment removal, and transportation.

19. Notwithstanding the provisions of Section 4.2 of the licensee's submittals specified in condition 12 of this License, the licensee shall operate the tailings impoundment system in accordance with statements representations and conditions specified in the licensee's application and enclosure of July 11, 1978.

20. The licensee is hereby exempted from the requirements of Section 20.203(e)(2) of 10 CFR 20 for areas within the mill, provided that all entrances to the mill are conspicuously posted in accordance with Section 20.203(e)(2) and with words, "Any area within this mill may contain radioactive material."

21. The licensee shall conduct and document at least one inspection of the tailings embankment per day and shall immediately notify Region IV, USNRC, Office of Inspection and Enforcement, Arlington, Texas, by telephone and telegraph of any failure in the dam retention system or tailings discharge system which results in a release of radioactive material from the tailings system. This requirement is in addition to the requirements of 10 CFR 20.

22. The licensee shall reclaim the Atlas Mill tailings disposal area in accordance with Section 3.2.5, as modified by the staff in alternative 2 of Section 10.3.2, of the "Final Environmental Statement Related to Operation of Moab Uranium Mill" (NUREG-0453, dated January 1979). In addition, surety arrangements covering the tailings reclamation costs shall be maintained.

23. The licensee shall decommission the Atlas Mill site in accordance with Section 4.4.1 of the licensee's revised Safety Analysis Report of August 28, 1975 and Annex C, "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material," dated November 1976 (enclosed). A detailed decommissioning plan shall be submitted for NRC review and concurrence at least 12 months prior to planned shut down of mill operations. In addition, surety arrangements covering the general mill site decommissioning costs shall be maintained.

24. The licensee shall submit to the U.S. NRC, Washington, D.C. 20555 a copy of the Surety Arrangements with the State of Utah, covering mill decommissioning and mill site and tailings area reclamation as well as supporting documentation showing a breakdown of the costs associated with reclaiming the mill and the tailings area within six months of the issuance of this license renewal. The licensee will send a copy of any future revision to these surety arrangements to the same office within 30 days of the revision.

The NRC will not terminate the license until final reclamation meets Utah standards and the surety bond is released according to state regulations.

25. Notwithstanding the provisions of Section 5.5.4 of the licensee's revised Safety Analysis Report of August 28, 1975, the licensee shall comply with the following:

a) The licensee shall conduct at least bi-weekly surface contamination surveys (both smear and total contamination) in all eating areas, change rooms, control rooms, and administrative offices.

b) The operating Mill Foreman shall conduct and document a daily visual surveillance of all mill areas to insure proper implementation of good radiation safety practices, including good clean-up practices to minimize unnecessary surface buildup of radioactive particulates.

c) If contamination levels in the lunch rooms, shower rooms, change rooms, or offices exceed the values in the attached Annex C, dated November, 1976, the area shall be decontaminated immediately and a study performed to determine the cause of buildup and corrective measures taken to prevent recurrence.

d) Prior to leaving the restricted area, all mill employees shall either shower or monitor themselves after changing clothes. If clothing is not changed then clothing shall also be monitored. An alpha radiation survey meter shall be available at the exit to the change room. In addition, the licensee shall perform spot surveys for alpha contamination at least quarterly on workers leaving the plant. Alpha contamination on skin or clothes greater than 1,000 dpm/100 cm^2 shall be cause for additional showering or decontamination and an investigation by radiation safety staff.

26. The licensee shall minimize dispersal of dust from the ore piles by water sprinkling or other dust suppression techniques, unless a documented weekly inspection indicates that the moisture content of the ore and/or weather conditions are controlling dusting.

27. The air sampling program shall include the collection of air samples during cleanup and maintenance operations as well as during normal operating conditions to demonstrate that employee exposures to airborne radioactivity concentrations are maintained as low as reasonably achievable in accordance with Section 20.1(c) of 10 CFR 20.

28. Radiation monitoring and sampling equipment shall be calibrated after repair and at least quarterly or at the manufacturer's suggested interval, whichever is sooner.

29. All mill radiological and environmental monitoring, bioassay, employee exposure evaluations, sampling, sample analysis, equipment calibration and related quality control programs shall be controlled by written procedure and shall be reviewed and revised every two years or as necessary by the mill Superintendent and the Radiation Safety Officer.

30. The licensee shall conduct monthly monitoring for Rn-222 daughter products as a part of the in plant radiological monitoring program. The locations for Rn-222 sampling shall be those specified in Table 5.5.2 of the licensee's revised Safety Analysis Report of August 28, 1975.

31. Before engaging in any activity not previously assessed by the NRC, the licensee shall prepare and record an environmental evaluation of such activity. When the evaluation indicates that such activity may result in a significant adverse environmental impact that was not assessed, or that is greater than that assessed in the Final Environmental Statement (NUREG-0453), the licensee shall provide a written evaluation of such activities and obtain prior approval of the NRC for the activity.

32. Prior to disturbing any presently undisturbed soils for mill related activities (including borrow areas for tailings reclamation cover) in the future, the licensee shall have an archeological survey conducted of the site(s) to be disturbed. The Utah State Department of Development Services and the U.S. Department of the Interior shall be contacted by the licensee prior to the survey to provide assistance or comment in planning such a survey. The completed survey shall be submitted to the USNRC for review and NRC approval to proceed shall be obtained prior to any disturbance of presently undisturbed areas.

33. If unexpected harmful effects or evidence of irreversible damage not otherwise identified in NUREG-0453 dated January 1979 are detected during construction or operations, the licensee shall provide to the NRC an acceptable analysis of the problem and a plan of action to eliminate or significantly reduce the harmful effects or damage.

34. The licensee shall insure that the automatic sprinkler system and the foam application system installed in the solvent extraction area are maintained in an operational condition to provide control over solvent fires in the storage tanks. In addition, the licensee shall insure that personnel involved in operational or emergency duties in the solvent extraction system area are trained in the operation of the emergency systems installed.

35. Release of equipment or packages from the restricted area shall be in accordance with Annex C, "Guidelines for Decontamination of Facilities and

Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material" dated November 1976 (enclosed).

36. Dikes shall be constructed around all hazardous chemical storage tanks to prevent spread of chemicals in case of spillage and shall be maintained and emptied as required, to assure they are effective.

37. Notwithstanding the provisions of Section 5.5.5.1 of the licensee's safety analysis report revised August 28, 1975, the licensee shall implement the environmental monitoring programs specified in Table 6.4 of NUREG 0453.

38. The licensee shall maintain sufficient records to furnish evidence of compliance with the radiological and environmental surveys and controls required by this license. Unless otherwise specified in NRC regulations, all such documentation shall be maintained for a period of at least five years.

39. Notwithstanding the Yellowcake Stack Sampling procedures of Table 4.1-4 of the Licensee's Safety Analysis Report revised August 28, 1975, or the semi-annual frequency requirements of Table 6.4 of NUREG 0453, the licensee shall conduct isokinetic sampling of the yellowcake drying and packaging stacks quarterly to determine U_{NAT}, RA-226 and Th-230 emissions.

40. The licensee shall conduct an annual survey of land use (grazing, residences, wells, etc.) in the area within two miles of the mill and submit a report of this survey annually to the Uranium Mill Licensing Section, U.S. NRC, Washington, D.C. 20555. This report shall indicate any differences in land use from that described in the licensee's Environmental Report of August 31, 1973, and supplements or the previous annual report. The first annual report shall be submitted by March 1980, and by March each year thereafter.

41. The licensee shall conduct a monitoring program to determine if small animals on the mill site have experienced a buildup of arsenic in their edible tissues. If elevated arsenic levels, compared to animals from background locations are found in small mammals on the site, the licensee shall analyze the potential impacts to raptors which may prey on the animals from the site and provide a report to the NRC, that addresses the arsenic levels found, the predicted impacts, and monitoring and other measures required to mitigate any impacts to local raptor populations.

42. The licensee shall compare the quarterly results of chemical and radiological analysis of the ground water down gradient from the tailings impoundment semi-annually to determine if identifiable trends of increasing

contamination exist down gradient from the impoundment. A report of the comparison including copies of the data used will be included in the environmental data required by condition 43 of this license.

43. The results of the effluent and environmental monitoring program required by this license shall be reported in accordance with 10 CFR 40, Section 40.65 with copies of the report sent directly to the U.S. NRC, Washington, D.C. 20555. In addition, the report shall also include a correlation of environmental radon monitoring data with meteorological data (wind speed and direction) during the time of sampling.

44. The licensee shall conduct a special survey program to determine the magnitude and location of fugitive tailings dust deposition due to past operations at the Moab mill site. The licensee shall measure gamma radiation levels in each of eight compass directions from the tailings pond at intervals of fifty meters or less, until exposure rates in air from the soil surface are below about 20 μ R/hr above background at one meter. The licensee shall submit the results of this survey with a plan for cleanup of contaminated areas offsite within twelve months of issuance of this renewal license.

45. Operations shall be immediately suspended in the affected areas of the mill if any of the emission control equipment for the ore feed or the yellowcake drying or drumming areas specified in the licensees submittal dated April 20, 1978, is inoperative.

For the U. S. Nuclear Regulatory Commission

Date April 23, 1979

By

Division of Fuel Cycle and
Material Safety
Washington, D.C. 20555

ANNEX C

GUIDELINES FOR DECONTAMINATION OF FACILITIES AND EQUIPMENT PRIOR TO RELEASE FOR UNRESTRICTED USE OR TERMINATION OF LICENSES FOR BYPRODUCT, SOURCE, OR SPECIAL NUCLEAR MATERIAL

U. S. Nuclear Regulatory Commission
Division of Fuel Cycle and
Material Safety
Washington, D.C. 20555

NOVEMBER 1976

The instructions in this guide in conjunction with Table I specify the radioactivity and radiation exposure rate limits which should be used in accomplishing the decontamination and survey of surfaces or premises and equipment prior to abandonment or release for unrestricted use. The limits in Table I do not apply to premises, equipment, or scrap containing induced radioactivity for which the radiological considerations pertinent to their use may be different. The release of such facilities or items from regulatory control will be considered on a case-by-case basis.

1. The licensee shall make a reasonable effort to eliminate residual contamination.

2. Radioactivity on equipment or surfaces shall not be covered by paint, plating, or other covering material unless contamination levels, as determined by a survey and documented, are below the limits specified in Table I prior to applying the covering. A reasonable effort must be made to minimize the contamination prior to use of any covering.

3. The radioactivity on the interior surfaces of pipes, drain lines, or ductwork shall be determined by making measurements at all traps, and other appropriate access points, provided that contamination at these locations is likely to be representative of contamination on the interior of the pipes, drain lines, or ductwork. Surfaces of premises, equipment, or scrap which are likely to be contaminated but are of such size, construction, or location as to make the surface inaccessible for purposes of measurement shall be presumed to be contaminated in excess of the limits.

4. Upon request, the Commission may authorize a licensee to relinquish possession or control of premises, equipment, or scrap having surfaces contaminated with materials in excess of the limits specified. This may include, but would not be limited to, special circumstances such as razing of buildings, transfer of premises to another organization continuing work with radioactive materials, or conversion of facilities to a long-term storage or standby status. Such requests must:

   a. Provice detailed, specific information describing the premises, equipment or scrap, radioactive contaminants, and the nature, extent, and degree of residual surface contamination.

   b. Provide a detailed health and safety analysis which reflects that the residual amounts of materials on surface areas, together with other considerations such as prospective use of the premises, equipment or scrap, are unlikely to result in an unreasonable risk to the health and safety of the public.

5. Prior to release of premises for unrestricted use, the licensee shall make a comprehensive radiation survey which establishes that contamination is within the limits specified in Table I. A copy of the survey report shall be filed with the Division of Fuel Cycle and Material Safety, USNRC, Washington, D.C. 20555, and also the Director of the Regional Office of the Office of Inspection and Enforcement, USNRC, having jurisdiction. The report should be filed at least 30 days prior to the planned date of abandonment. The survey report shall:

   a. Identify the premises.

   b. Show that reasonable effort has been made to eliminate residual contamination.

   c. Describe the scope of the survey and general procedures followed.

   d. State the findings of the survey in units specified in the instruction.

Following review of the report, the NRC will consider visiting the facilities to confirm the survey.

TABLE I

ACCEPTABLE SURFACE CONTAMINATION LEVELS

NUCLIDES [a]	AVERAGE [b c f]	MAXIMUM [b d f]	REMOVABLE [b e f]
U-nat, U-235, U-238, and associated decay products	5,000 dpm α/100 cm^2	15,000 dpm α/100 cm^2	1,000 dpm α/100 cm^2
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	100 dpm/100 cm^2	300 dpm/100 cm^2	20 dpm/100 cm^2
Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	1,000 dpm/100 cm^2	3,000 dpm/100 cm^2	200 dpm/100 cm^2
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except SR-90 and others noted above.	5,000 dpm $\beta\gamma$/100 cm^2	15,000 dpm $\beta\gamma$/100 cm^2	1,000 dpm $\beta\gamma$/100 cm^2

[a] Where surface contamination by both alpha- and beta-gamma-emitting nuclides exists, the limits established for alpha- and beta-gamma-emitting nuclides should apply independently.

[b] As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

[c] Measurements of average contaminant should not be averaged over more than 1 square meter. For objects of less surface area, the average should be derived for each such object.

[d] The maximum contamination level applies to an area of not more than 100 cm^2.

TABLE I
2

The amount of removable radioactive material per 100 cm^2 of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of less surface area is determined, the pertinent levels should be reduced proportionally and the entire surface should be wiped. .

The average and maximum radiation levels associated with surface contamination resulting from beta-gamma emitters should not exceed 0.2 mrad/hr at 1 cm and 1.0 mrad/hr at 1 cm, respectively, measured through not more than 7 milligrams per square centimeter of total absorber.

APPENDIX B

SUMMARY DESCRIPTION OF ATLAS CORPORATION

Atlas is a 50-year old, New York Stock Exchange company with interests in the natural resources, services and manufacturing industries. The Company has over 40,000 shareholders of record and over 1,000 employees. Following is a summary of the key financial data of the Company:

As of June 30, 1978:

Total Assets	$ 83,159,000
Total Liabilities	43,938,000
Net Assets	$ 39,221,000

Year Ended June 30	Sales	Net Income
1974	$ 35,436,000	$ 1,564,000
1975	40,689,000	3,015,000
1976	44,361,000	4,025,000
1977	55,077,000	7,020,000
1978	53,674,000	1,138,000

Atlas conducts its natural resources business through its Minerals Division. The Minerals Division mines uranium and uranium/vanadium ores at various locations in the State of Utah and mills these ores, as well as ores purchased from others, at the Company's mill in Moab, Utah. Production at the Moab mill during calendar year 1978 was 1,005,000 pounds of uranium oxide (yellowcake) and 2,560,000 pounds of vanadium pentoxide.

The service activities of the Company are conducted through its International Atlas Services Division. The division owns a 55% interest in and is the Manager of Global Associates, a joint venture with H. C. Smith Construction Company. Global Associates provides logistical support and other services under a number of contracts with the U. S. Army, The Army Corps of Engineers, The Arabian American Oil Company and others. Global has over 4,000 employees and is responsible for the operation of facilities with a value in excess of $1 billion.

The manufacturing activities of the Company are conducted through three divisions:

1. The Western Sky Industries Division manufactures at its plant in Hayward, California plastic and metal products used widely in the aircraft and automotive industries as well as in other industries.

2. The Brockton Sole & Plastics Division produces in Brockton and Brookfield, Massachusetts, and in Winchester, Tennessee, polyethylene, polystyrene, leather, molded fiber and rubber products, mainly for the shoe industry.

3. The Camden Lime Company Division, headquartered in Kresson, New Jersey, produces precast and prestressed concrete systems and central mixed concrete at four plants in New Jersey. It also sells masonry building supplies. It markets its products in an area encompassing southern New York, New Jersey, Delaware and eastern Pennsylvania.

APPENDIX C

SUMMARY OF STABILIZATION AND RECLAMATION OF THE MILL TAILINGS DISPOSAL AREA FOR ATLAS MINERALS MILL AT MOAB, UTAH

INTRODUCTION

This report presents a summary of the stabilization and reclamation program of the mill tailings disposal area for the Atlas Minerals Mill at Moab, Utah. For clarity, the report is divided into several sections. Initially, a brief history of the required reclamation program is presented. This will be followed by a second section which summarizes the actual reclamation program as it is accepted by the U.S. Nuclear Regulatory Commission and by a final section which presents the cost estimates including an itemization of the costs used.

HISTORY

On August 31, 1973, Atlas Minerals submitted an environmental report to the Atomic Energy Commission as a supplement to the application for a source material license renewal in accordance with the requirements of 10 CFR 40.32 and 10 CFR 50. In this report it was stated that, as reclamation, the tailings pile is to be covered with earth to a depth sufficient to bring radiation levels into compliance with the standards then applicable. It was estimated in the environmental report that the total cost of reclamation of $100,000 to $150,000 should be sufficient to perform the work.

In 1975 a safety analysis report was submitted by Atlas Minerals. Essentially, the same statement for a reclamation plan was given. On August 15, 1975, a document entitled, "Second Supplement to the Environmental Report for the Uranium Mill of Atlas Minerals....." was submitted to the NRC. The purpose of the report was to present a stabilization plan for the uranium tailings area and to present costs involved in accomplishing the stabilization. Five alternatives were considered in developing the proposed reclamation program. The plan as proposed in the report is summarized as follows:

> Sufficient time should be allowed for the surface water to evaporate from the tailings pond. The tailings fines in the center portion of the pond would then be buried by a cover of coarse beach tailings material. A one-foot layer of cover material would be applied to the top surface of the tailings which would be shaped to form a crown facilitating runoff. Maintenance of the pond would be such that the cover material would be added as needed when erosion channels would start to form.

Also, in responding to a list of questions submitted to Atlas by NRC on October 28, 1976, Atlas presented a number of plant types that could be used to vegetate the area as part of the reclamation program.

A new study was undertaken at the request of Mr. Ross Scarano of the NRC in a letter dated May 5, 1977. The purpose of this study was to discuss all viable tailings management and reclamation

alternatives, including a cost-benefit for each alternate based upon the most recent set of NRC performance objectives. This study was performed by comparing a total of 10 options including - (1) four options reclaiming the tailings disposal area at the present site, (2) three options transporting the tailings to a site located seven miles northwest of the mill, (3) two options transporing the tailings 15 miles northwest of the site, and (5) one option transporting the tailings to the existing Rio Algom tailings impoundment area. The study concluded that the existing tailings area can be successfully reclaimed and protected at its present location such that future exposure to man and the environment can be reduced to the maximum extent reasonably achievable. The benefit which could be achieved by moving the tailings do not appear to outweigh high incremental costs of these options. The least expensive means of reclamation was considered to be as follows:

> The pile is to be shaped and contoured such that the slimes tailings is to be covered by at least five feet of non-slimes tailings and to promote runoff from the pile. The tailings is to be capped with clay imported from off-site, in turn overlain by silty fine sand obtained from the site and near-site sources, and one foot of topsoil. The thickness of the layer is to be one foot over non-slimes area and is to be 1.5 feet in areas where five feet of non-slimes overlie slimes. The thickness of the silty fine sand is to be 2.3 feet in the non-slimes area and is to be 2.7 feet in areas where five

feet of non-slimes overlie slimes. The area is to be revegetated with appropriate plant species. The estimated cost of this option was determined to be $3.3 million for the abandonment activities.

In November, 1977, the NRC issued their draft report of the environmental statement which described the reclamation program to be as follows:

> The clay cover as modified by the NRC staff calculations would be 1.75 foot thick over the non-slimes area and 2.0 feet thick in areas where five feet of non-slimes overlie the slimes. The silty, fine sands would be 4.0 feet thick in the non-slimes area and 4.3 feet thick in areas where five feet of non-slimes overlie the slimes. The area would then be revegetated with plant species appropriate to the area. The estimated cost of the proposed stabilization plan was found to be $3.3 million, the same figure as used for Option 1 in Atlas' reclamation alternative study report.

The final reclamation program as it appears in the NRC's final environmental statement, issued in January, 1979, revised the program as it appeared in the draft report. This final program is presented in the following section.

STABILIZATION AND RECLAMATION OF THE MILL TAILINGS AREA

MATERIAL AVAILABLE FOR RECLAMATION

The tailings disposal site is located within the breached crest of the Moab Valley-Spanish Valley salt anticline. Alluvial, eolian, and colluvial deposits consisting principally of silty fine sand but including a variety of soils, form the valley. Consolidated sedimentary strata of Precambrian and Pennsylvanian through Tertiary age are extensively exposed in the area.

Surface samples of soil and rock in the vicinity of the mill were sampled and tested in the laboratory. Haul distance, property ownership, land use and environmental considerations were also considered when analyzing material availability.

The main purposes of cover material for the reclamation of the tailings pile are - (1) to provide a seal against diffusion and release of radon gas, (2) to provide mass to protect against direct gamma radiation, (3) to provide protection against erosion of the cover and tailings, and (4) to provide a surface which will blend into the surrounding area for aesthetic purposes.

The diffusion coefficient as defined in a published paper by M. B. Sears entitled, "Correlation of Radioactive Waste Treatment Costs and the Environmental Impact of Waste Affluents in the Nuclear Fuel Cycle for Use in Establishing 'As Low as Practical' Guides - Milling of Uranium Ores," determines the radon-attenuation characteristics of a given material. Soil properties which

influence the diffusion coefficient are listed below, in approximate decending order of importance:

1. Moisture Content
2. Gas Permeabilities
3. Clay Content
4. Clay Minerology
5. Bulk Density.

The ability of the cover to stop gamma radiation is mainly a function of bulk density. Erosion protection can be provided by a coarse granular cover, by adequate vegetation, or by an erosion-resistant artificial shell.

The most prevalent material in the area is the reddish brown silty fine sand derived from the weathering of the Mesozoic sandstones. Although it is difficult to project land availability, it is believed that this material could be obtained from the Spanish Valley area, a haul distance of approximately seven miles.

A clay material would provide a seal against radon diffusion with a smaller thickness than the silty sand. The Mancos shale is exposed about 17 miles northwest of the site and is weathered sufficiently in the near-surface to provide a workable clay. Sufficient quantities of material for reclamation purposes are available in that area where land is used principally for grazing.

The closest durable gravel deposits are located adjacent to Mill Creek where it enters Spanish Valley about six miles southeast of the mill. However, the material is limited and may not be available in the future. Similar deposits occur extensively

in the southern end of Spanish Valley about 15 miles from the mill. The deposits consist of fine to coarse gravel with some cobbles in a matrix of fine sand with some silt. The gravel is well-rounded and derived from igneous intrusives of the LaSal Mountains.

Artificial materials such as concrete, asphalt, and synthetic sheets have been considered for use in the cover. These materials were rejected for use generally because of their service lives and cracking and tearing potentials.

Vegetative stabilization would require the addition of soil amendments such as fertilizer and organic matter to the surface cover material. Supplemental nitrogen and phosphorous would be required. The vegetation recommended for the Moab area are: crested wheatgrass, Siberian wheatgrass, Indian ricegrass, and sand dropseed. In particular, a mixture of Siberian wheatgrass and sand dropseed planted at eight pounds per acre and two pounds per acre, respectively, is recommended if a vegetative covering were to be opted. Siberian wheatgrass was recommended over crested wheatgrass because it is more drought resistant. Sand dropseed is a warm-season grass and does well in sandy soils. Continued irrigation of the tailings area to establish vegetation is not recommended. Observations have shown that continuous irrigation has resulted in leaching of salts and/or toxic metals which would kill the vegetation at the base. Vegetative stabilization should produce a self-perpetuating cover or foster entrapment in germination of native plant seeds. An ecological succession would

establish leaching to a vegetative covering in complete harmony with the surrounding environment. The drawback to vegetative stabilization is the possibility of root penetration into the tailings, providing a potential pathway into the food chain of radionuclides and toxic elements. In addition, there is the possibility that radon may be released through the plant transpiration stream.

Placing a durable coarse gravel over the cover material is the desired method of protecting the cover from wind and water erosion. The gravel would have the disadvantage of inhibiting or preventing plant growth and its appearance would be out-of-place with the surrounding environment. The problem of root penetration into the tailings would be largely avoided, however. The required gradation of the gravel is such that the material will range in size from a fine sand (about .1 inches in diameter) to a medium cobble (9 inches in diameter). The average particle size would be that of a fine gravel (about one-quarter inch in diameter).

RECOMMENDED RECLAMATION PLAN

The recommended reclamation plan consists of continued operation of the existing tailings retention area in much the same manner as in the past. When the mill life has ended reclamation will begin as soon as the area has reached sufficient dryness (probably within two years following the mill shutdown). The pile will be shaped and contoured such that slimes tailings will be covered by at least five feet of non-slimes tailings and to promote runoff

from the pile. The tailings would be capped with clay imported from the previously mentioned site, 17 miles northwest of the tailings pile, in turn overlain by silty fine sand obtained from the site and near-site deposits and by one foot of gravel.

The following cover thicknesses are based on background radon flux as used by the NRC staff. The thickness of the clay liner will be two feet over areas of non-slimes as well as areas where five feet of non-slimes overlie slimes. The thickness of the silty fine sand will be 3.35 feet in the non-slimes areas and 6.7 feet in areas where five feet of non-slimes overlie slimes. The one-foot gravel wind-erosion protection surface will cover the entire mound. The contouring of the pile will be such that no slopes would be greater than 10 horizontal to 3 vertical.

ESTIMATED COSTS

The unit costs of the excavating, transporting, and placing of each of the materials were determined on present-day prices. The costs have not been discounted.

SILTY FINE SAND

The cost of excavating and placing silty fine sand obtained from the site is estimated to be $1.50 per cubic yard while the cost from the site seven miles from the tailings pile would be $3.00 per cubic yard.

CLAY

The Mancos shale borrow site about 17 miles northwest of the tailings pile was considered as the borrow source. The cost of

excavating, transporting, and placing the material is estimated at $3.86 per yard.

GRAVEL

The source of gravel will be the gravel deposits occurring in the southern end of Spanish Valley about 15 miles from the mill. The cost of excavating, transporting, and placing the gravel is estimated to be $4.90 per yard.

COST ESTIMATE CALCULATIONS

GENERAL

An estimate has been prepared for the anticipated costs of the recommended reclamation plan. The unit costs used in the estimate are presented above.

SUMMARY

	Covering	Thicknesses, ft. Over Covered Slimes	Over Non-Slimes
(1)	Clay Cap----------	2.0	2.0
(2)	Silty Fine Sand----------	3.35	6.7
(3)	Gravel Thickness----------	1.0	1.0

	Item	Estimated Cost
1.	Reshaping----------	$ 20,000.
2.	Burial of Slimes----------	92,767.
3.	Clay Liner----------	1,629,140.
4.	Silty Fine Sand----------	2,140,245.
5.	Gravel----------	1,027,692.
	TOTAL	$4,909,844.

DETAIL OF COSTS

Item 1. Reshaping

Volume Required: 100,000 cu. yds.
(from 2nd Supplement to Environmental Report pg. 3-6)
Cost = $0.20 per cu. yd * 100,000 cu. yds.
= $20,000

Item 2. Burial of Slimes

Area of slimes = 46 acres

$$\text{Cost} = 46 \text{ acres} * 5 \text{ feet} * \frac{43560 \text{ sq. ft.}}{1 \text{ acre}} * \frac{1 \text{ cu. yd.}}{27 \text{ cu. ft}} * \frac{\$0.25}{\text{cu. yds.}}$$

= $92,767

Item 3. Clay liner

Total Area = 130 acres

$$\text{Cost} = 2.0 \text{ ft} * 130 \text{ acres} * \frac{43560 \text{ sq. ft.}}{1 \text{ acre}} * \frac{1 \text{ cu. yd.}}{27 \text{ cu. yd.}} * \frac{\$3.86}{\text{cu. yd.}}$$

= $1,619,140

Item 4. Silty fine sand

Non-Slimes area

$$3.35 \text{ ft.} * 84 \text{ acres} * \frac{43560 \text{ sq. ft.}}{1 \text{ acre}} * \frac{1 \text{ cu. yd.}}{27 \text{ cu. ft.}}$$

= 453,992 cu. yd.

Five ft. non-slimes/slimes area

$$6.67 \text{ ft.} * 46 \text{ acres} * \frac{43560 \text{ sq. ft.}}{1 \text{ acre}} * \frac{1 \text{ cu. yd.}}{27 \text{ cu. ft.}}$$

= 497,227 cu. yds.

Required Amount = 951,221 cu. yds.

Assume: One-half of silty fine sand is from on-site, and one-half from off-site.

On-site: 475,610 cu. yds. * $\frac{\$1.50}{\text{cu. yd.}}$ = $713,415

Off-site: 475,610 cu. yds. * $\frac{\$3.00}{\text{cu. yds.}}$ = $1,426,830

TOTAL $2,140,245

Item 5. Gravel

Total area = 130 acres

Cost = 1.0 ft. * 130 acres * $\frac{43560 \text{ sq. ft.}}{1 \text{ acre}}$ * $\frac{1 \text{ cu. yd.}}{27 \text{ cu. ft.}}$ * $\frac{\$4.90}{\text{cu. yd.}}$

= $1,027,692

STATE OF UTAH

EXECUTIVE DEPARTMENT

EXECUTIVE ORDER

WHEREAS, in Source Material License No. SUA-917 issued to Atlas Corporation, effective April 30, 1979, the United States Nuclear Regulatory Commission has delegated to the State of Utah the responsibility to approve a surety arrangement covering the obligation of Atlas Corporation to reclaim its mill and associated tailings at Moab, Utah, following the permanent cessation of operations at the mill; and

WHEREAS, as Governor of the State of Utah, I am authorized by Section 26-25-4, Utah Code Annotated, 1953, to accept such delegation of responsibility on behalf of the State of Utah;

NOW, THEREFORE, I, Scott M. Matheson, Governor of the State of Utah, by virtue of the authority granted to me as Chief Executive Officer of the State, and under the authority contained in Section 26-25-4, Utah Code Annotated, 1953, do hereby accept on behalf of the State of Utah the delegation of responsibility from the United States to the State of Utah in Source Material License No. SUA-917 to approve a surety arrangement covering reclamation of the Atlas Corporation uranium mill and associated tailings at Moab, Utah, and do hereby designate the Board of Oil, Gas and Mining to consider for approval such surety or other arrangement.

IN WITNESS WHEREOF, I have set my hand and caused to be affixed the Great Seal of the State of Utah. Done at the State Capitol in Salt Lake City, Utah, this 15th day of May, 1979.

GOVERNOR

Scott M. Matheson

ATTEST:

David S. Monson
SECRETARY OF STATE

EXECUTIVE ORDER

WHEREAS, in Source Material License No. SUA-917 issued to Atlas Corporation, effective April 30, 1979, the United States Nuclear Regulatory Commission has delegated to the State of Utah the responsibility to approve a surety arrangement covering the obligation of Atlas Corporation to reclaim its mill and associated tailings at Moab, Utah, following the permanent cessation of operations at the mill; and

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This Order shall take effect on the date hereof.

Done at Salt Lake City, Utah, this ____ day of May, 1979.

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